

ART AND SCIENCE BEHIND ESTHETIC OCULAR PROSTHESIS: A CASE REPORT

Ponnanna A.A.¹, Gaurav Tripathi², Amit Porwal³, Mansi Patel⁴

¹ Professor HOD Department of Prosthodontics, Pacific Dental College Udaipur (Rajasthan) India

² Post-graduate Student Departments of Prosthodontics, Pacific Dental College Udaipur (Rajasthan) India

³ Reader Department of Prosthodontics, Pacific Dental College Udaipur (Rajasthan) India

⁴ Post-graduate Student, Department of Prosthodontics, Pacific Dental College Udaipur (Rajasthan) India

Address for correspondence

Dr. Gaurav Tripathi

Post-graduate Student

Department of Prosthodontics

Pacific Dental College

Debari, Udaipur. (Raj.) India Pin: 313024

Email: dr.gauravtitan23@gmail.com

Ph.No. 8233860303

ABSTRACT

Objective: Facial disfigurement can hamper an individual's personality. Maxillofacial prosthesis helps in rehabilitating such patients and makes them socially acceptable. It is not uncommon for a person to have a natural eye removed as a result of trauma, congenital abnormality, tumour or an infection and an artificial prosthesis is probably the only solution in such cases to rehabilitate the patient.

Case report: The present article describes a case report of an 80 year old patient treated with custom-made ocular prosthesis of the right eye. Customization of the shade was done after processing the prosthesis in order to achieve a more lifelike appearance.

Conclusion: Meticulously fabricated custom made ocular prosthesis of appropriate size, color and contour can provide an acceptable aesthetic result.

Key-words: *Ocular prosthesis; split cast; wax pattern; characterization*

INTRODUCTION

Face is the index of an individual's personality. It not only depicts various emotions, but is also a channel for verbal and non-verbal communication. Head and neck surgeries can be highly mutilating and disfiguring and can deeply affect an individual's beliefs and confidence. (1) The disfigurement resulting from loss of an eye can cause significant psychological impairment as well as social isolation. However, with recent advances in ophthalmic surgery and ocular prosthesis, replacement of an eye has become easier and effective. (1, 2)

Surgical procedures adopted for the removal of an eye are classified by Peyman, Saunders and Goldberg (1987) into three general categories: enucleation, evisceration and exenteration. (3, 4) An ocular prosthesis is a simulation of human anatomy using prosthetic materials. An illusion of a perfectly normal healthy eye and surrounding tissue is thereby created. A person in need of an ocular prosthesis may have lost or damaged his/her natural eye due to trauma, malignancy or a congenital defect. The primary purpose of an ocular prosthesis is to maintain the volume of eye socket ,create an illusion of a perfectly normal healthy eye and surrounding tissue and facilitate excellent eye movements which not only enhances the appearance but also the self-esteem and confidence of the patient.(2,5)

CASE REPORT

An eighty year old man reported to the Department of Prosthodontics, Pacific Dental College & Hospital with the complaint of missing right eye (Fig1). History revealed surgical removal of the eye ball after a traumatic injury. On examination of the socket, healthy conjunctival lining and absence of

infection was found. Treatment plan included fabrication of custom made ocular prosthesis.



Figure 1 Pre-operative



Figure 2 1st pour with orientation groove

IMPRESSION TECHNIQUE

The impression of the anophthalmic eye socket was made by mixing irreversible hydrocolloid alginate (Zelgan, Dentsply India) impression material with excess cold water until it was free flowing, sacrificing the strength of the material in order to avoid tissue distortion. The mixed alginate was loaded in a disposable plastic syringe, which was introduced in the socket and injected between the eyelids.

Once the material was injected, gauze soaked in plaster was dipped in water and applied over the impression material in order to retrieve the impression after setting. Patient was asked to perform various eye movements and then look straight so as to record the functional impression and remove excess material. (6, 7)

After the material had set cheek, nose and eyebrow regions were massaged to break the seal. While the patient gazed upwards, the cheeks were pulled down and the inferior portion of the impression was rotated out of the socket. Impression was checked for accuracy and excess material was trimmed.



Figure 3 Placement of iris



Figure 4 Final waxup with retentive handle

GLOBE FORMATION

Removal of the impression was done followed by boxing of the entire impression at its periphery, allowing the full impression of the ocular defect to be completely embedded in the poured cast.

The first half of sectional cast was poured while keeping the impression surface facing upwards. Indexing of the first pour was done so as to allow orientation of the second half. (Fig 2)



Figure 5 Processed ocular prosthesis



Figure 6 Application of red strands

WAX PATTERN FORMATION

In order to prepare the wax pattern for the ocular prosthesis, the inner surface of the mould was coated with separating medium. Modeling wax was heated and the molten wax was poured into the mold.

Additional wax was poured to compensate for the wax shrinkage. Then mold was opened to retrieve the wax pattern. The irregularities in the wax pattern and sharp edges were removed and recontoured into a smooth hemispheroid. The wax pattern should be highly polished and free from dust and debris before placing it in the socket.

At the time of try- in of scleral wax pattern, it is checked for:

- Any area of discomfort or pressure points and relieved if present;
- The eye contour and lid configuration from different angles, with the patient's eyes open and by manual palpation with the eyes closed;
- Center the height of convexity over the pupil which is usually slightly medial to the midline between the inner and outer canthi;
- The eyelids should close completely over the wax pattern;
- The contours and palpebral fissure should resemble the adjacent natural eye. Finally the fit of the wax pattern was assessed by orchestrating various eye movements.



Figure 7: Final wax up after characterization

PLACEMENT OF IRIS

The shade and size of the iris was determined and marked on the wax pattern using normal eye as the guide. To achieve this exact location, a white paper was secured on the forehead with the help of micropore tape. The midline of face and the position of the natural iris were marked while the patient was asked to look straight ahead at a distant object. The distance was measured from the midline to the centre of the pupil of the natural eye and the same distance was marked on the left side and engraved into the wax pattern. The pattern was then taken out and keeping this position in mind, the iris was placed and adjusted according to the horizontal and vertical axis. Also the eye movements were checked for symmetry and function. It was found that the wax pattern showed movements in synchronization and harmony with the patient's natural eye movements. This gave a realistic feeling and instilled confidence in the patient. (Fig 3)

Shade selection for ocular prosthesis:

A close-up photograph of the patient's natural eye was taken to determine the color of cornea. Shade selection of the sclera was done using the natural eye as a guide. The patient had a diffused yellowish normal eye showing more veins than usual, which needed to be duplicated in the prosthesis.

Flasking

After the trial of wax pattern the master cast was trimmed about the size of the flask. Onto this the wax pattern was sealed and the whole assembly was invested as it is done for compression moulding laboratory procedures. A plastic tube was attached to

the iris disc to function as retentive tag so as to prevent iris displacement during dewaxing. (Fig 4)

Dewaxing

The second pour was done in such a way that the handle attached to the iris was embedded into the plaster of the counter flask. Then the dewaxing was done after the final set, taking care so that there was complete elimination of wax from the mold space.



Figure 8 Final prosthesis

Packing and curing

This step is important, as it involves the characterization of the prosthesis with tooth colored heat cure polymethylmethacrylate of appropriate shade, matching the scleral color of the normal eye of the patient. It was seen that surrounding the iris, a violet halo was present in the natural eye and hence violet stain was mixed with monomer and spread into mould cavity surrounding the iris and finally a C-shade tooth colored heat cure polymethylmethacrylate (DPI Heat Cure) was selected, mixed and poured in mold area. Processing was done similar to the normal denture using a long curing cycle with heat cure tooth colored resin. The acrylized prosthesis was then retrieved from the flask and trimmed to remove the handle and all irregular

and sharp surfaces. (Fig 5) The prosthesis trial was then done.

At this stage the prosthesis needed to be characterized to give it a life like appearance. This is the most important step of the entire procedure as it requires an artistic flair on the part of the prosthodontist. Acrylic resin was removed to a depth of 1 mm around the corneal button of the prosthesis with an acrylic trimmer. A combination of yellow, brown acrylic paint was applied on the trimmed surface to simulate the color of the natural eye using the photograph of the normal eye as a guide. The colors were selected and mixed using monomer as the thinning agent. To simulate blood vessels, red nylon strands were placed. (Fig 6) One needs to be perfect at their artistic skills to match the adjacent eye and simulate a natural appearance. Then a thin layer of wax was added over the corneal region to flush with the iris disc. (Fig 7)



Figure 9 Final prosthesis in right eye

Then the prosthesis was again flaked and dewaxed followed by packing with clear heat cure polymethylmethacrylate (DPI Heat Cure). This was followed by the routine processing.

After the processing, the prosthesis was trimmed, finished and polished. At the time of insertion, aesthetics, fit and the movement of the prosthesis were assessed. (Fig 8, 9)

DELIVERY OF PROSTHESIS

- The prosthetic eye was washed with soap and water. A drop or two of an ophthalmic lubricant on the surface of the prosthesis facilitates insertion.
- After insertion, eyes are examined for aesthetic appearance and the degree of movement by instructing the patient to perform the movement in various directions.
- Necessary adjustments were carried out and the prosthesis was finished, polished and inserted.

As the patients demand for aesthetics of the prosthesis were exacting and his wish to avoid wearing glass spectacles was accepted before starting the treatment, painting of the scleral region was redone twice to the patient's satisfaction and for a normal appearance. Patient was satisfied with his appearance and performed excellent eye movements which helped him boost his self confidence and belief of being presentable in the society.

Post insertion instructions included regular removal and cleaning of the prosthesis with a ophthalmic irrigation solution.

DISCUSSION

Eye is a vital organ not only to provide vision but also as an important component of facial expressions. Loss of an eye results into a psychological scar for the patients as well as their families. Immediate replacement of the lost eye is necessary to promote

physical and psychological healing of the patient and to improve their social acceptance.(3) Custom made heat cured acrylic resin ocular prosthesis with proper orientation, contour, characterization, size of pupil and iris provides realism and symmetry to the patient's face. (8) It not only improves facial appearance but also lifts the confidence of the patient. Close adaptation of the custom made prosthesis tends to distribute pressure more equally than the stock eye prosthesis. (9)This helps to reduce the incidence of abrasion or ulceration. Accurately fabricated custom made prosthesis not only gives the fullness to the eye but also facilitates various eye movements which is important for the patient to gain self-confidence. (1,2) In this case the aesthetic concern of the patient was addressed through the exact color match of the iris and sclera with the adjacent eye. This can be achieved by characterization after processing the prosthesis which gives a more lifelike quality to the prosthesis and increases the esthetic value and self-esteem of the patient. (2)

CONCLUSION

Most vital concern of a patient needing an ocular prosthesis is long lasting esthetics and comfort. Custom made ocular prosthesis fulfils the need of comfort of the patient. However, limitation of such prosthesis is its less natural appearance in comparison to the stock prosthesis. In order to overcome this, a supplementary step of characterization has been integrated in fabrication of custom made ocular prosthesis. The technique presented in this paper emphasizes on fulfilling the esthetic expectation of the patient with additional characterization of the custom made prosthesis.

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